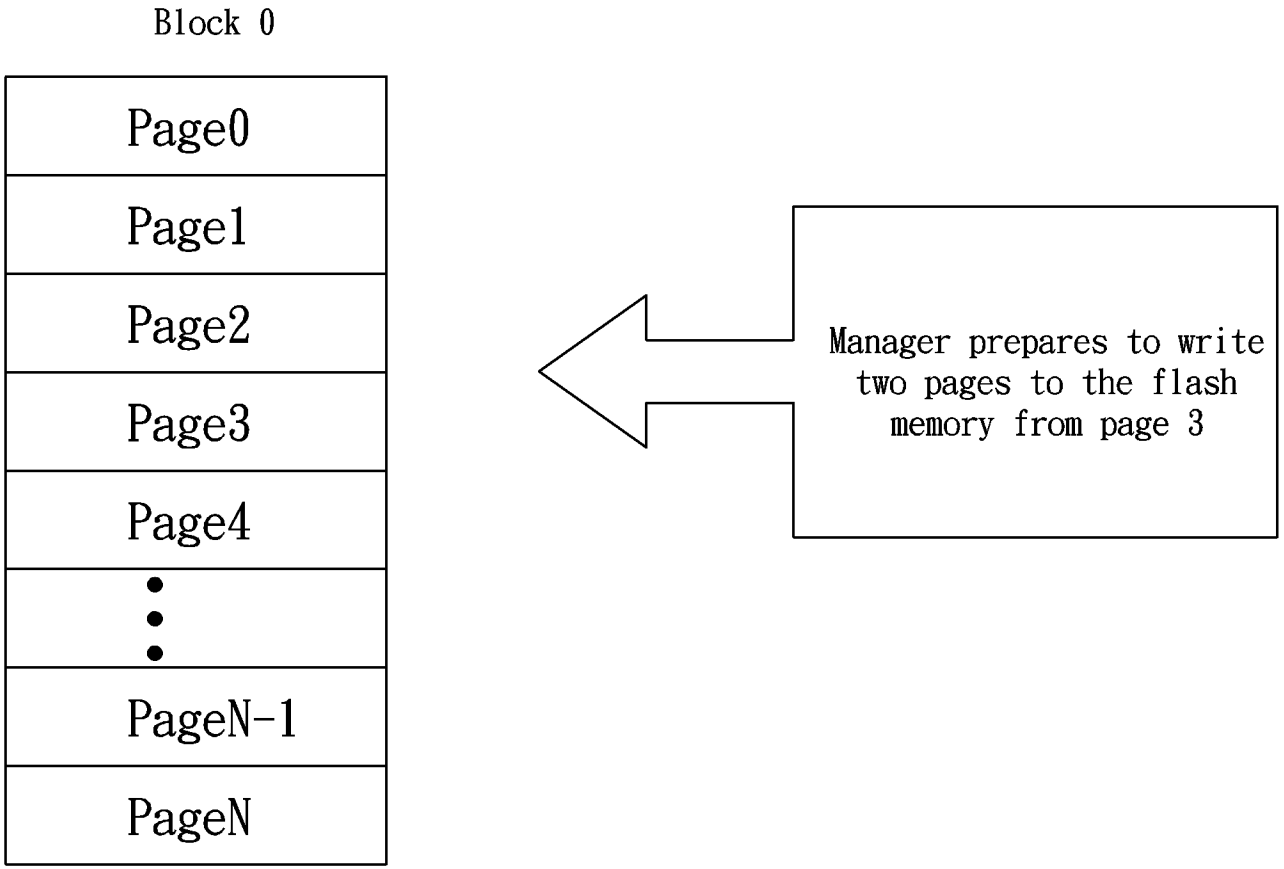
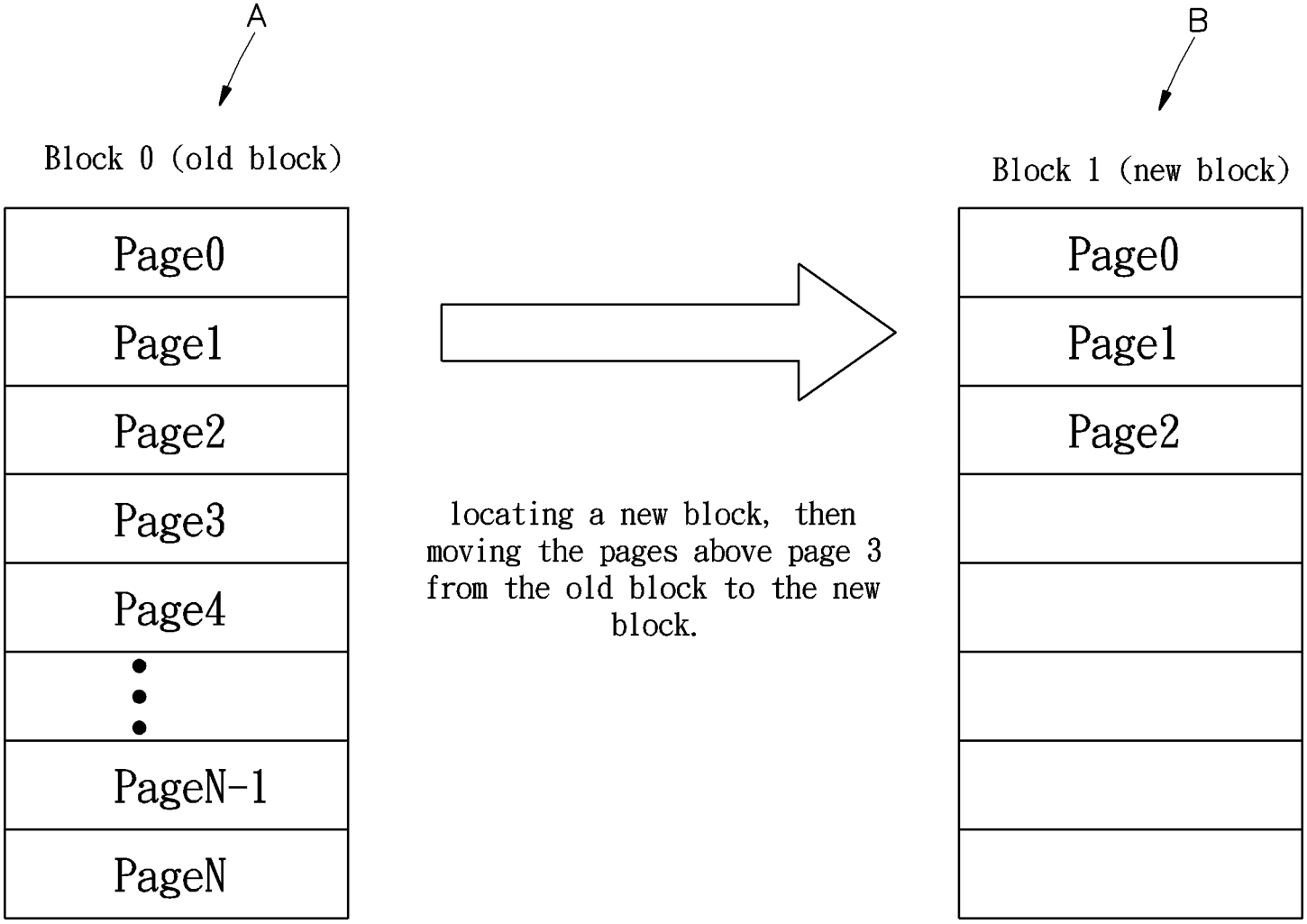


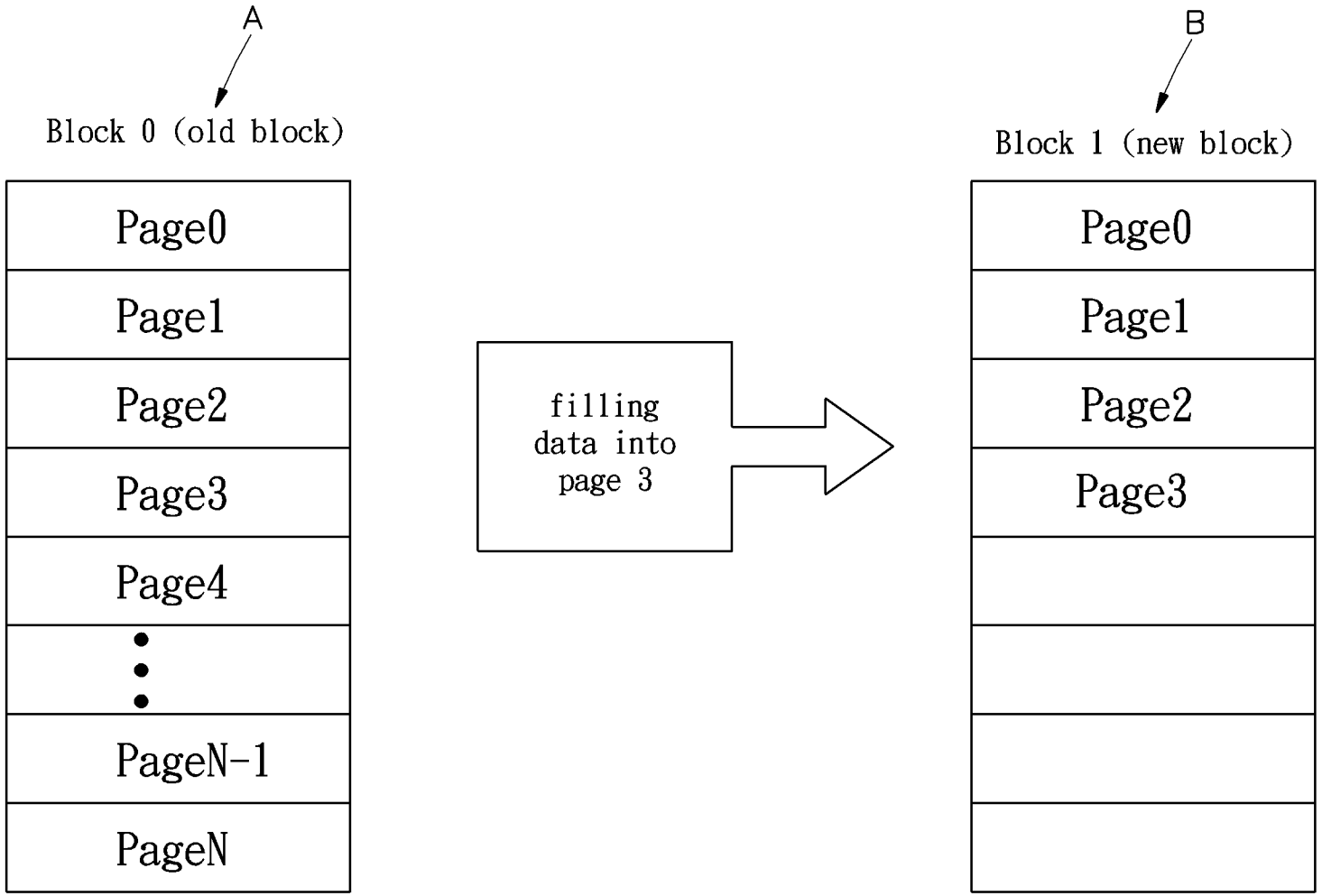
PRIOR ART

FIG. 1



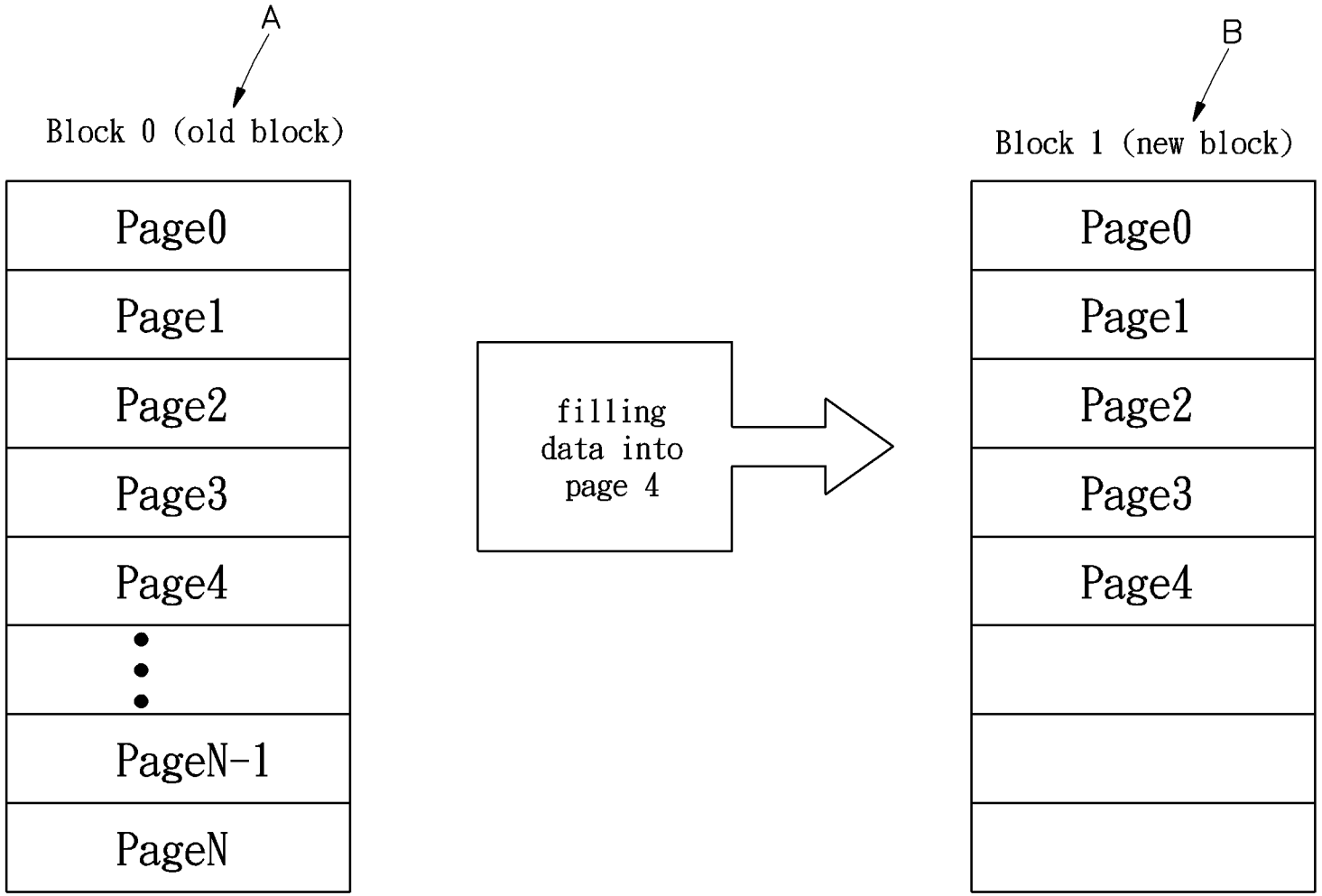
PRIOR ART

FIG.2



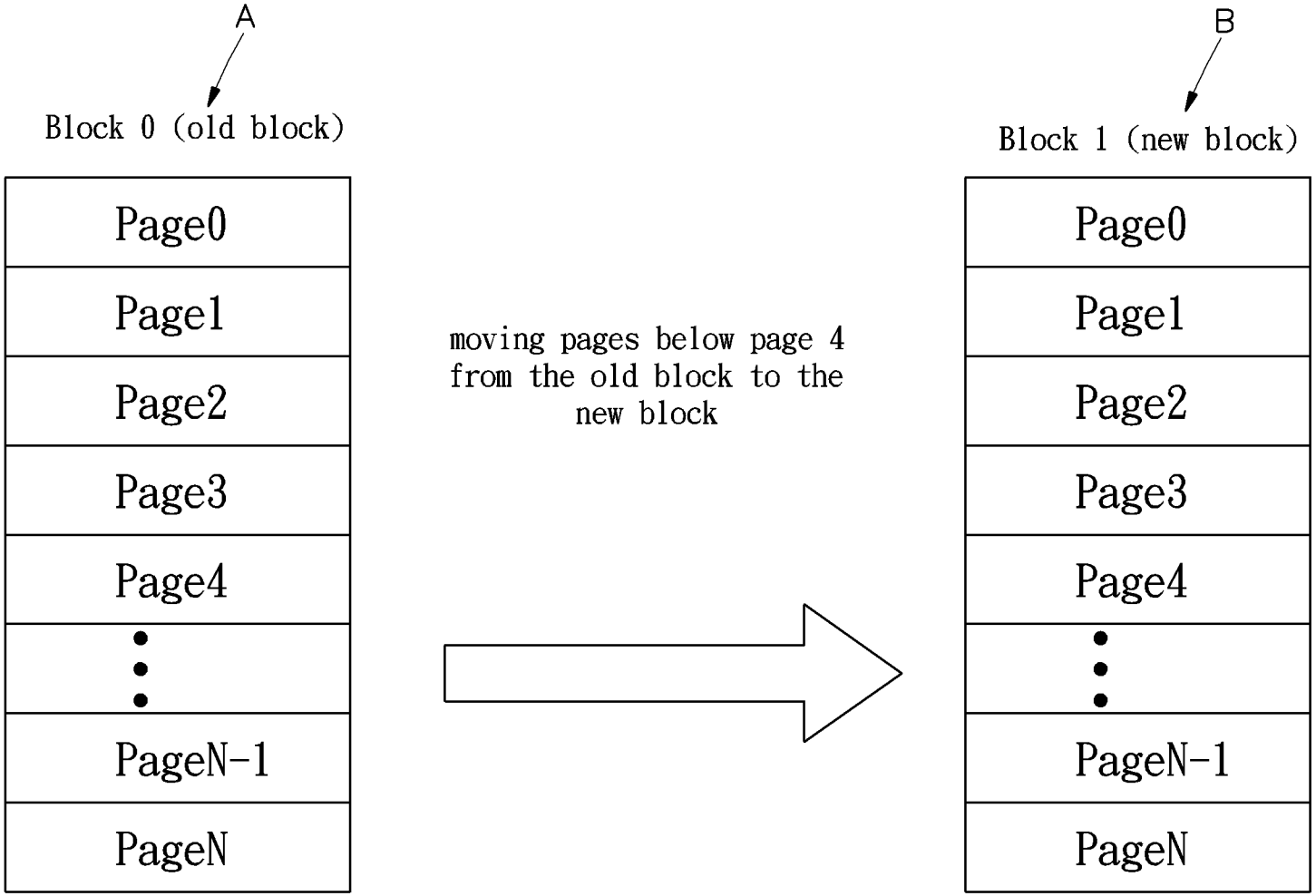
PRIOR ART

FIG.3



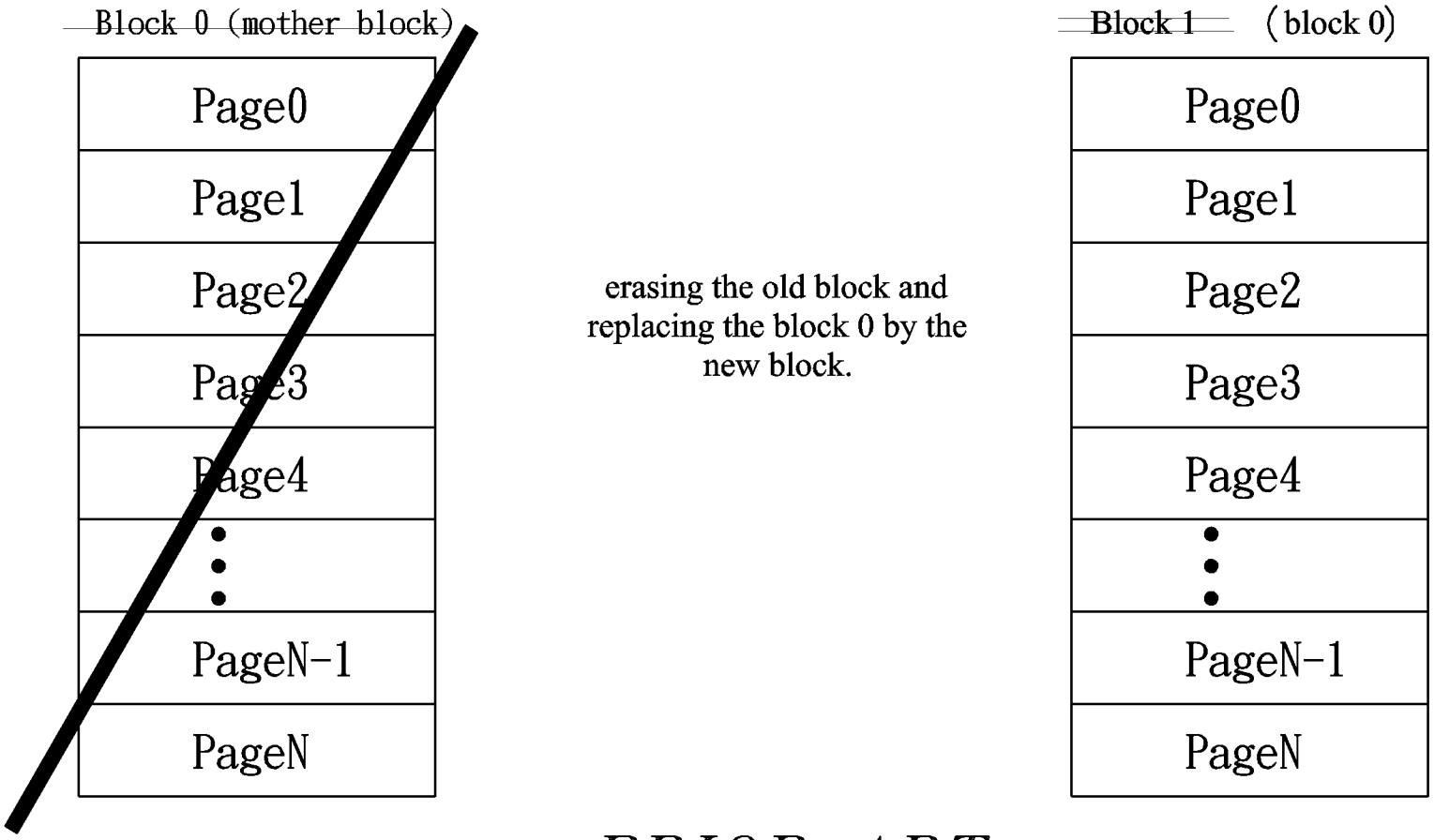
PRIOR ART

FIG.4



PRIOR ART

FIG.5



PRIOR ART

FIG. 6

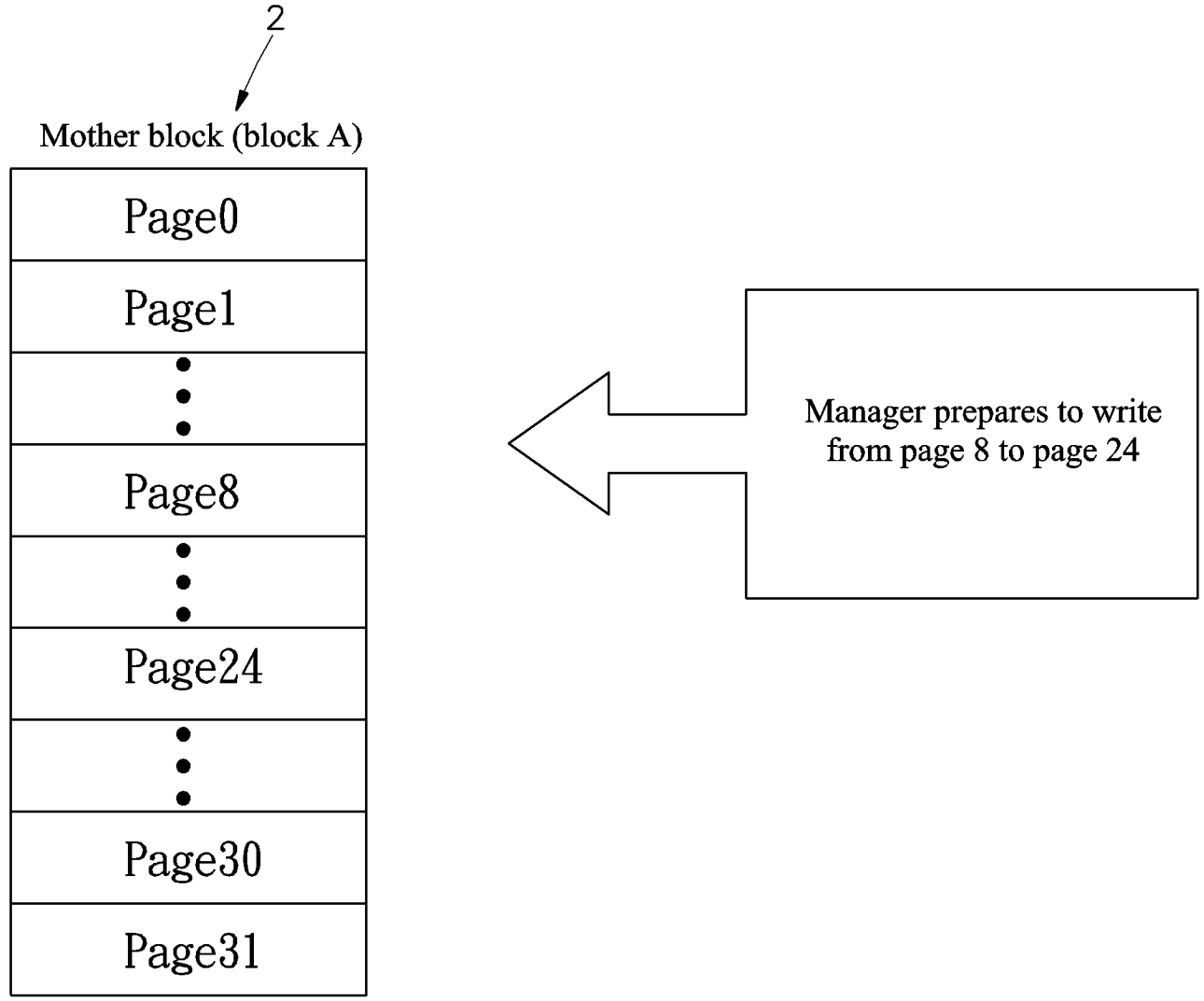

2
Mother block (block A)
Page0
Page1
Page8
Page24
Page30
Page31
Manager prepares to write from page 8 to page 24

FIG. 7

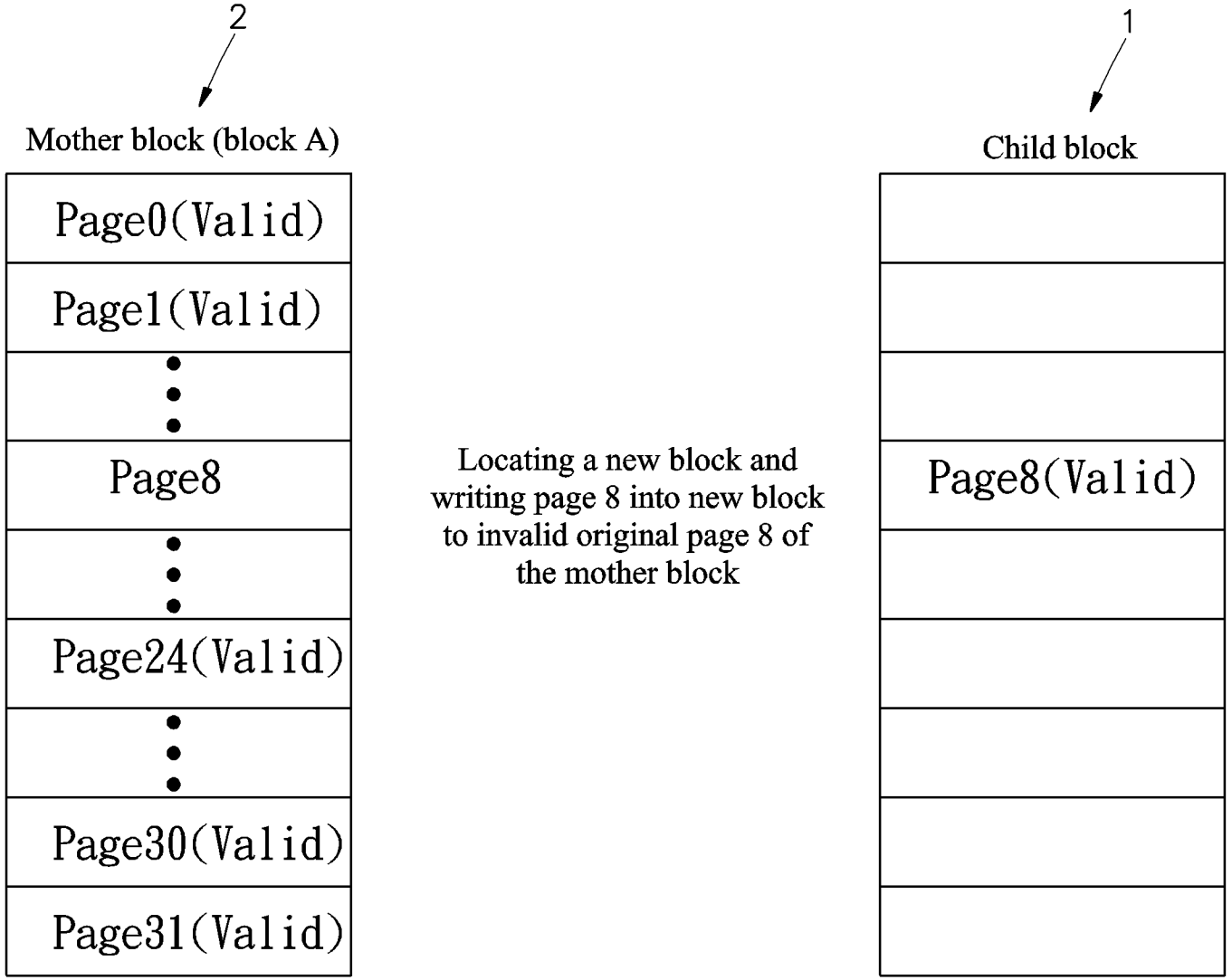

2
Mother block (block A)
Page0(Valid)
Page1(Valid)
Page8
Page24(Valid)
Page30(Valid)
Page31(Valid)
Locating a new block and writing page 8 into new block to invalid original page 8 of the mother block
1
Child block
Page8(Valid)

FIG. 8

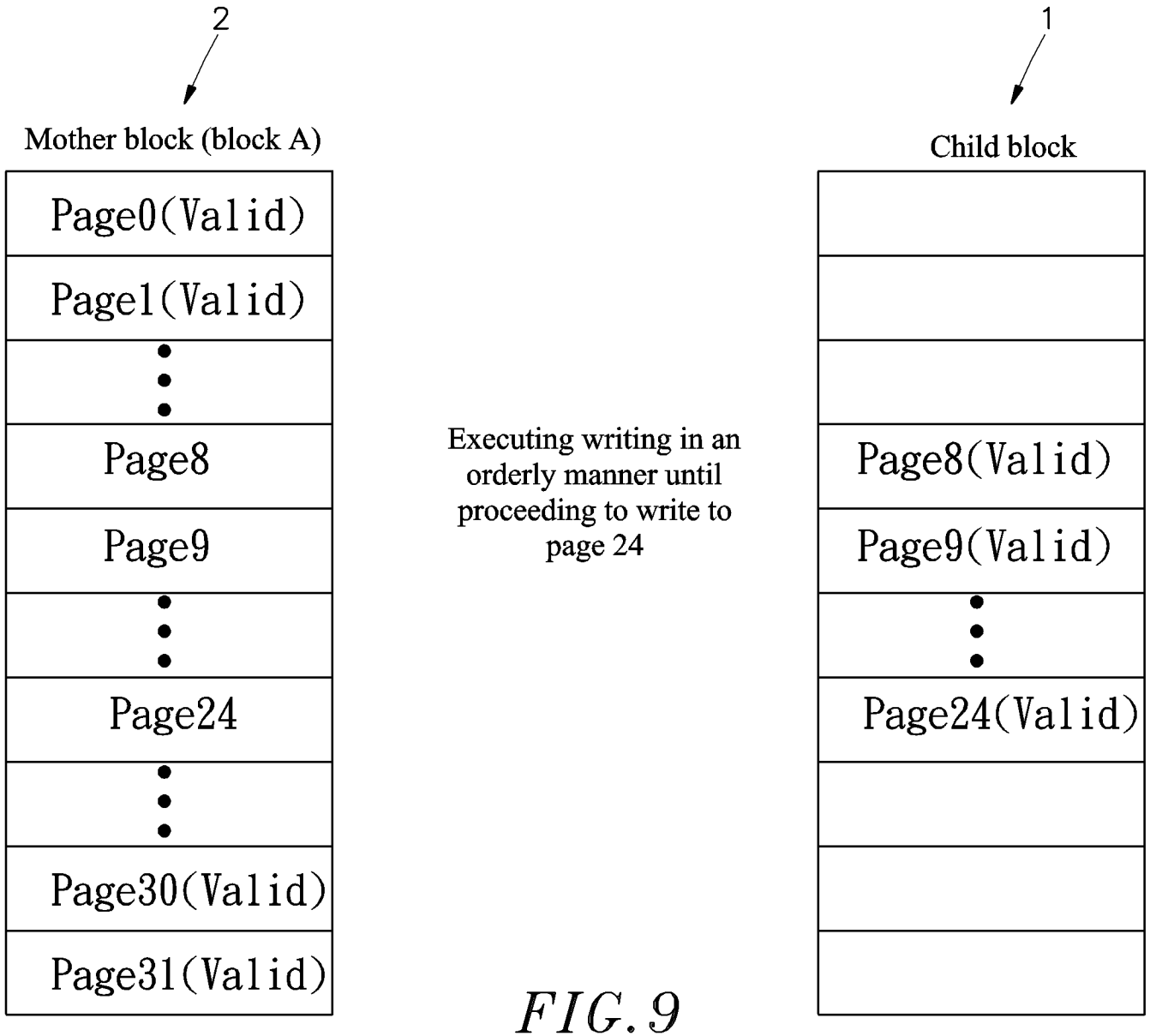

2
Mother block (block A)
Page0(Valid)
Page1(Valid)
Page8
Page9
Page24
Page30(Valid)
Page31(Valid)
Executing writing in an orderly manner until proceeding to write to page 24
1
Child block
Page8(Valid)
Page9(Valid)
Page24(Valid)

FIG. 9

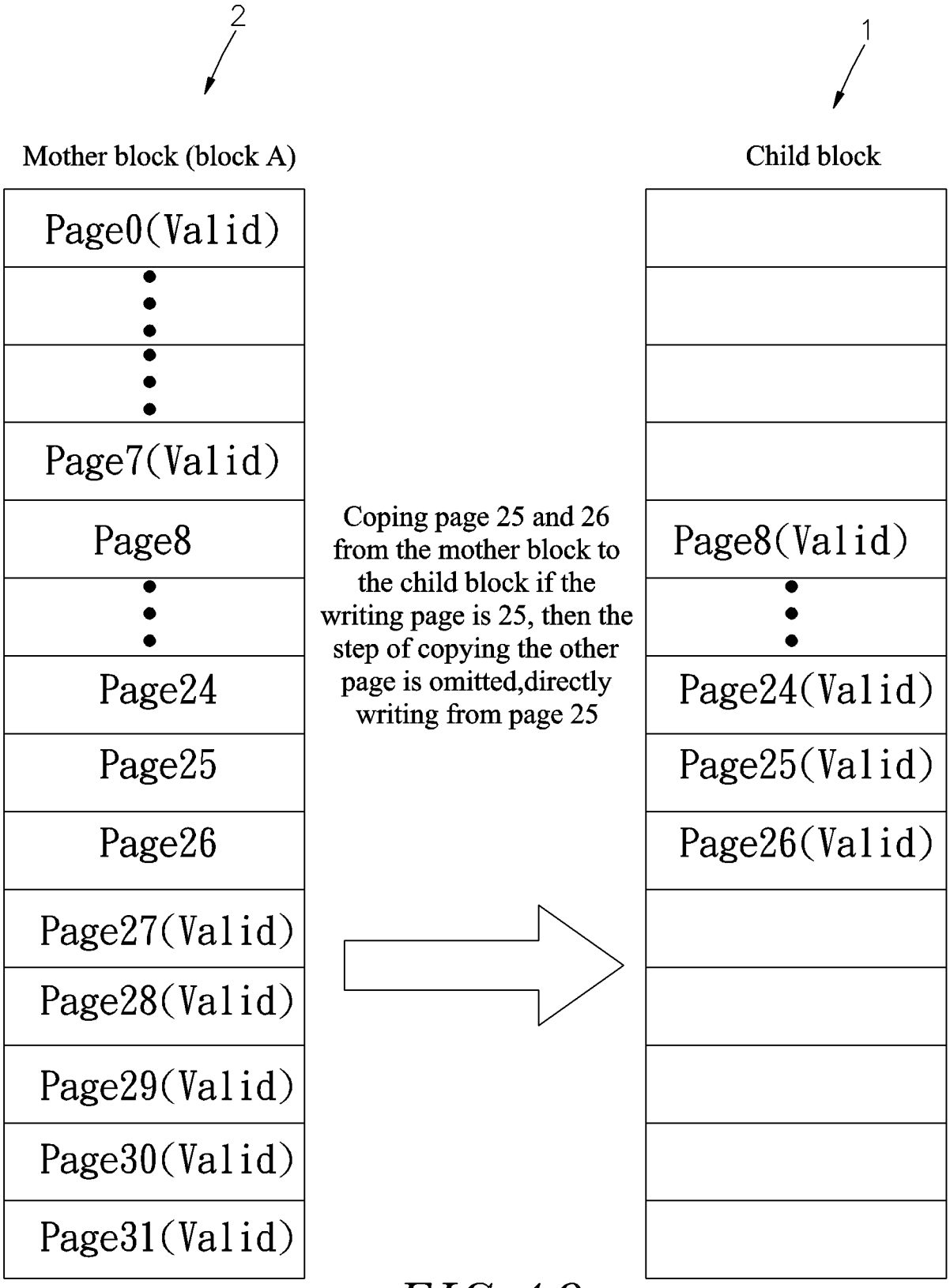

2
1
Mother block (block A)
Child block
Page0(Valid)
Page7(Valid)
Page8
Page24
Page25
Page26
Page27(Valid)
Page28(Valid)
Page29(Valid)
Page30(Valid)
Page31(Valid)
Coping page 25 and 26 from the mother block to the child block if the writing page is 25, then the step of copying the other page is omitted,directly writing from page 25
Page8(Valid)
Page24(Valid)
Page25(Valid)
Page26(Valid)

FIG. 10

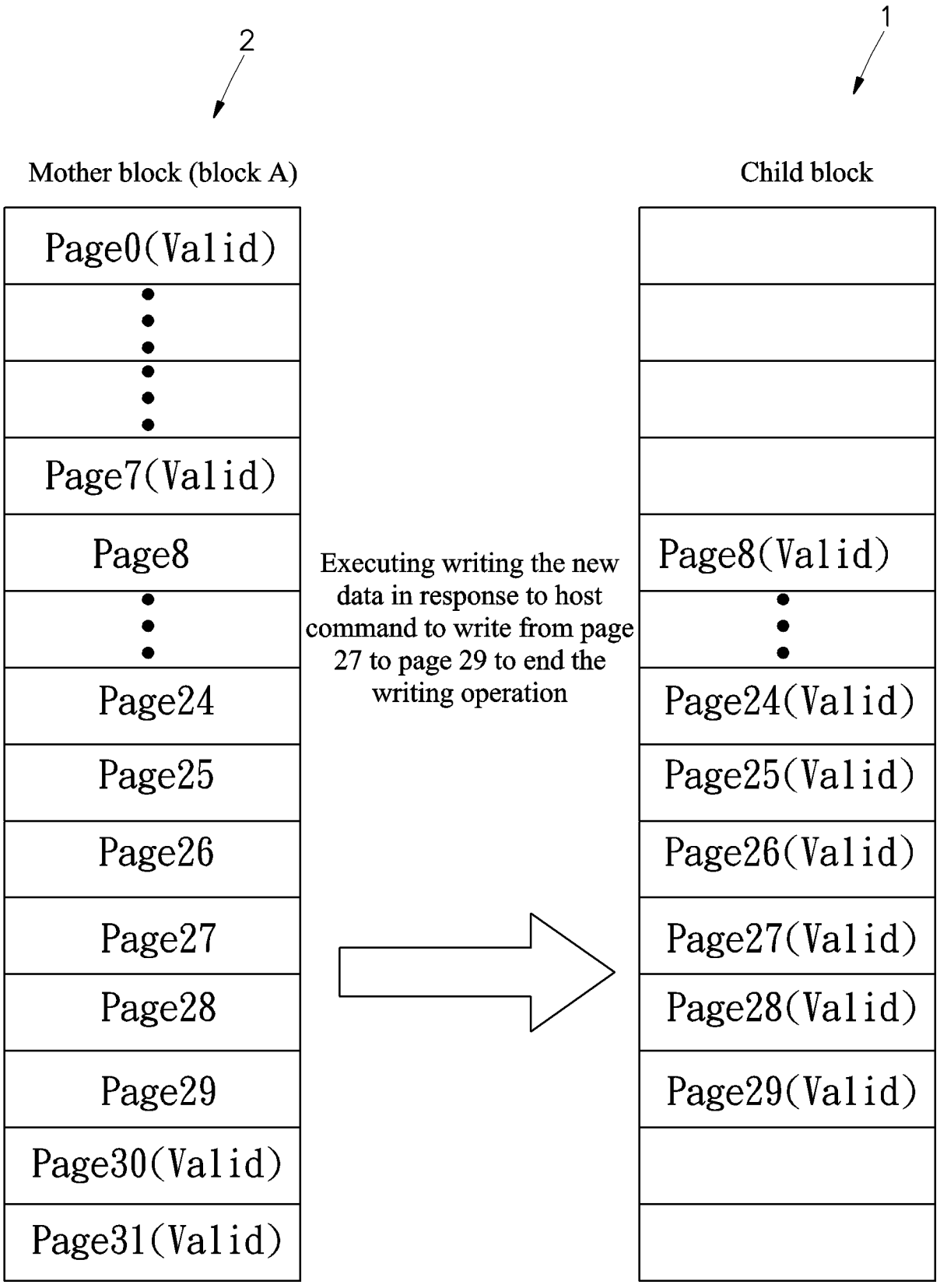

2
1
Mother block (block A)
Child block
Page0(Valid)
Page7(Valid)
Page8
Page24
Page25
Page26
Page27
Page28
Page29
Page30(Valid)
Page31(Valid)
Executing writing the new data in response to host command to write from page 27 to page 29 to end the writing operation
Page8(Valid)
Page24(Valid)
Page25(Valid)
Page26(Valid)
Page27(Valid)
Page28(Valid)
Page29(Valid)

FIG. 11

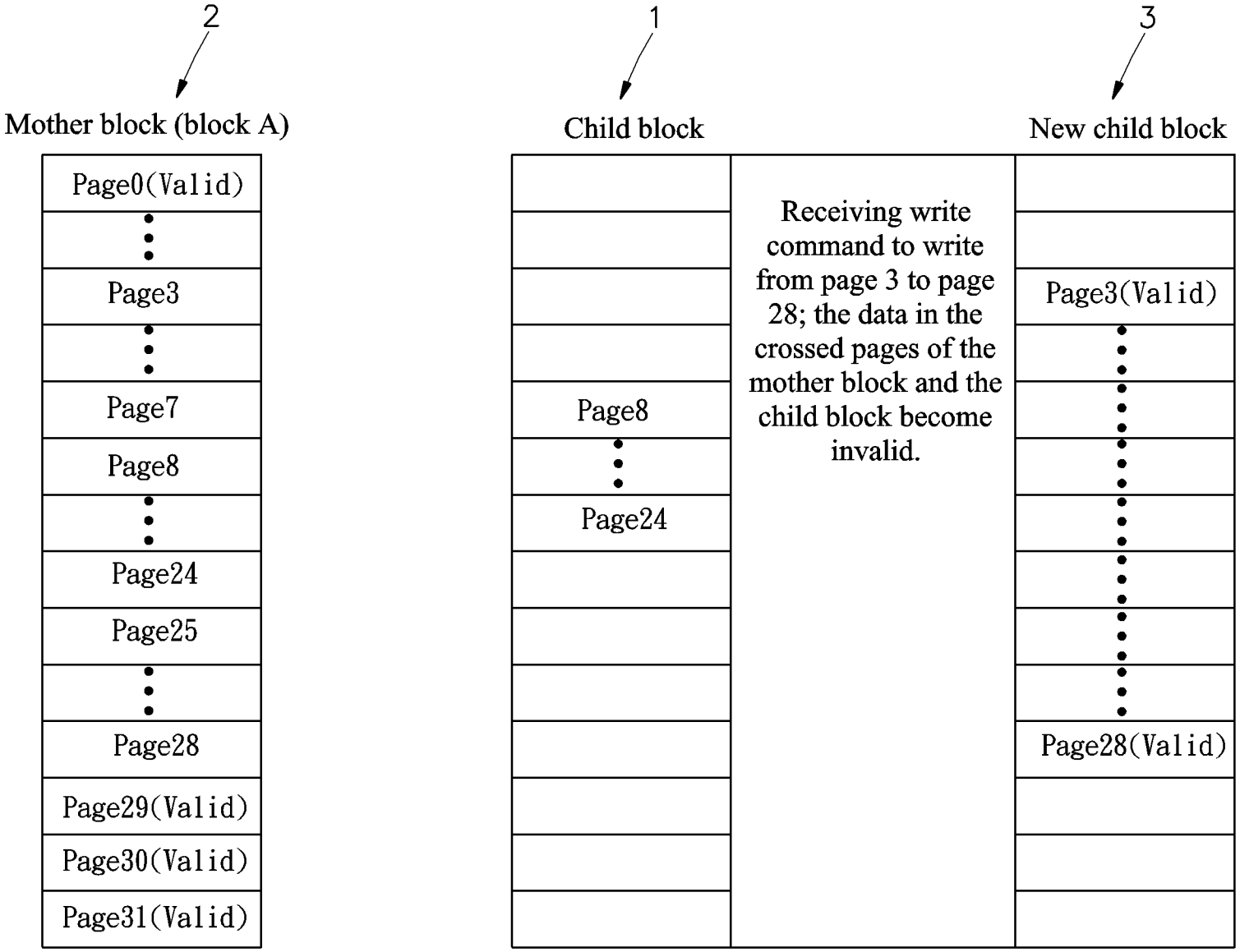

2
Mother block (block A)
Page0(Valid)
Page3
Page7
Page8
Page24
Page25
Page28
Page29(Valid)
Page30(Valid)
Page31(Valid)
1
Child block
Page8
Page24
Receiving write command to write from page 3 to page 28; the data in the crossed pages of the mother block and the child block become invalid.
3
New child block
Page3(Valid)
Page28(Valid)

FIG. 12

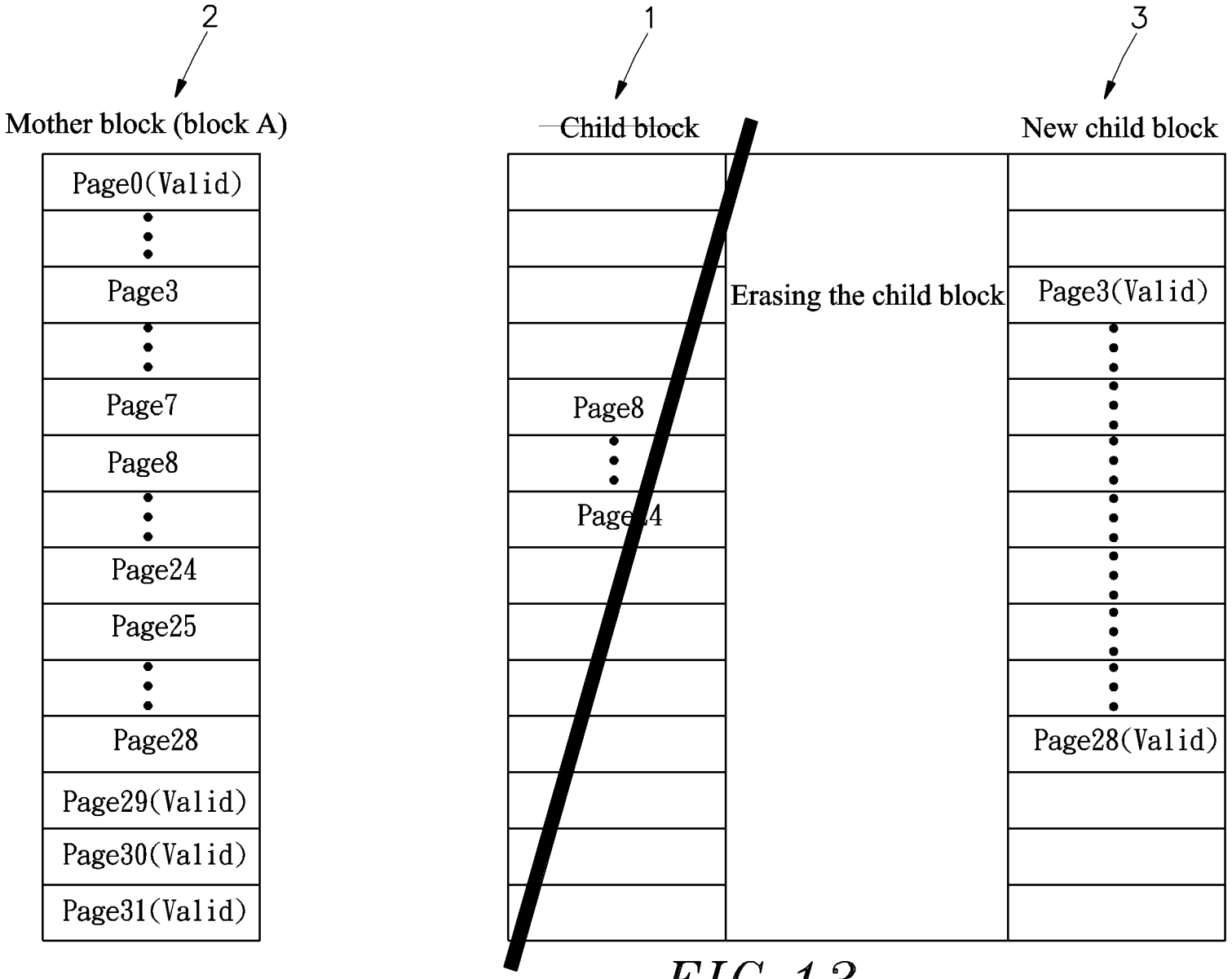

2
Mother block (block A)
Page0(Valid)
Page3
Page7
Page8
Page24
Page25
Page28
Page29(Valid)
Page30(Valid)
Page31(Valid)
1
Child block
Page8
3
New child block
Erasing the child block
Page3(Valid)
Page28(Valid)

FIG. 13

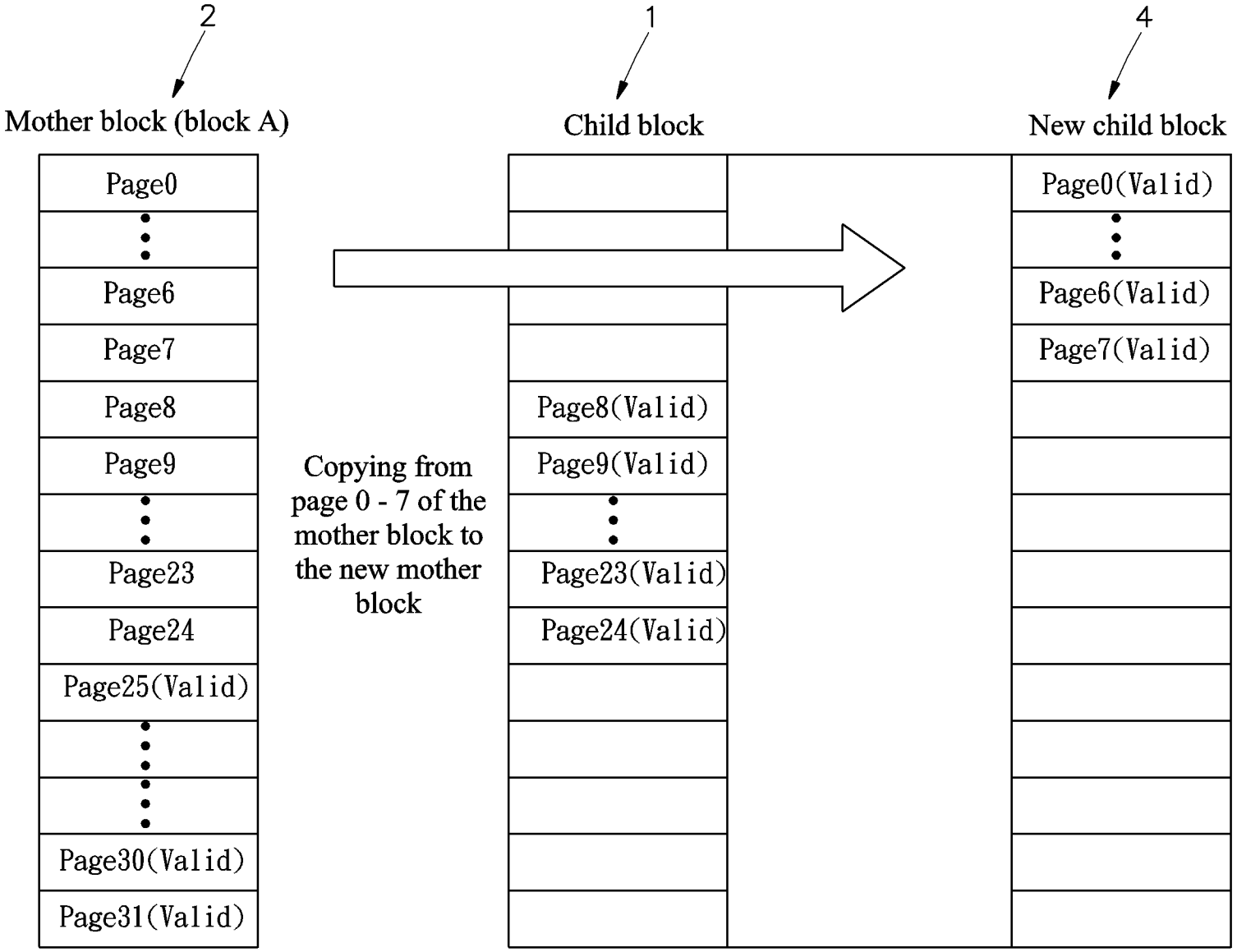

2
1
4
Mother block (block A)
Child block
New child block
Page0
Page6
Page7
Page8
Page9
Page23
Page24
Page25(Valid)
Page30(Valid)
Page31(Valid)
Copying from page 0 - 7 of the mother block to the new mother block
Page8(Valid)
Page9(Valid)
Page23(Valid)
Page24(Valid)
Page0(Valid)
Page6(Valid)
Page7(Valid)

FIG. 14

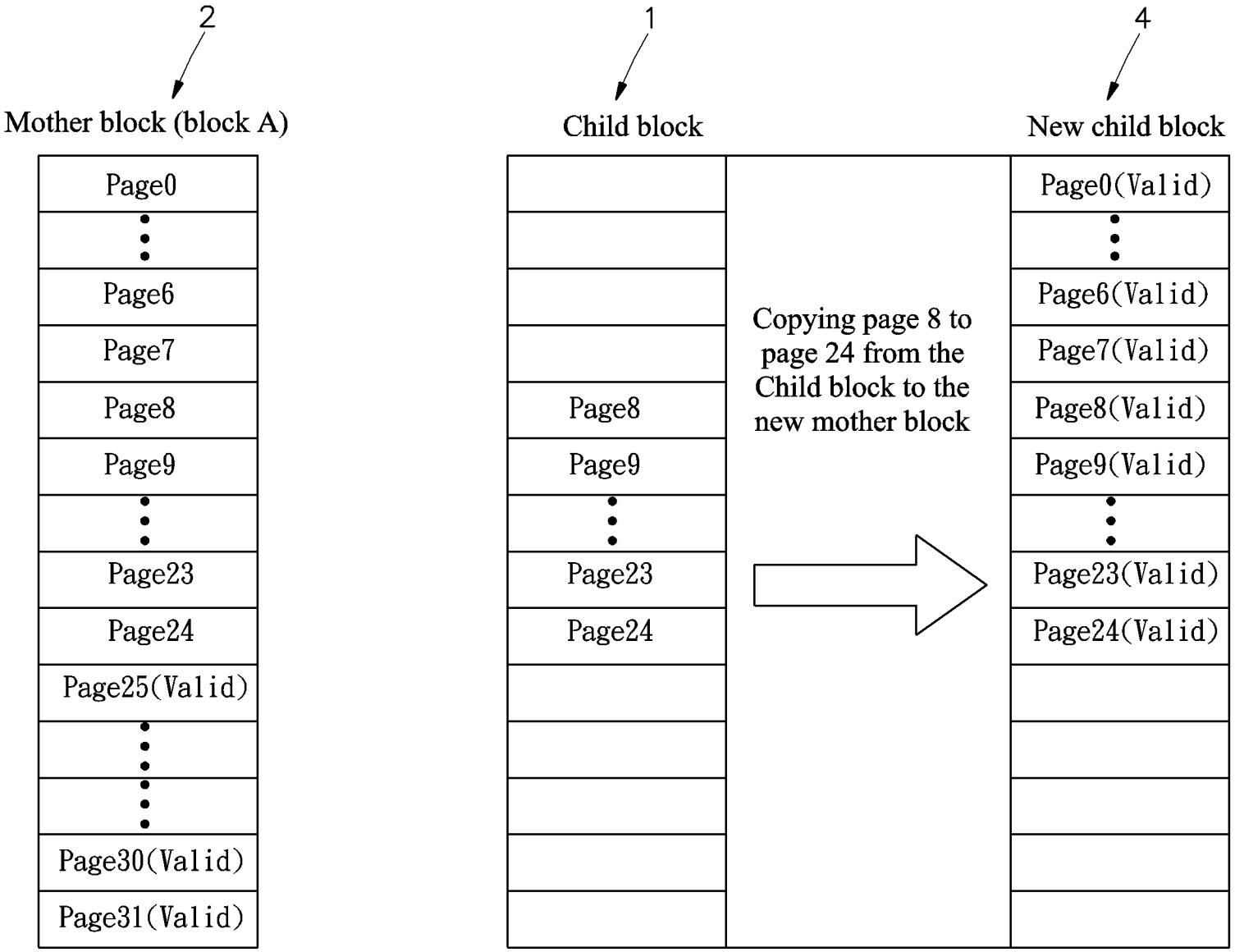

2
Mother block (block A)
Page0
Page6
Page7
Page8
Page9
Page23
Page24
Page25(Valid)
Page30(Valid)
Page31(Valid)
1
Child block
Page8
Page9
Page23
Page24
Copying page 8 to page 24 from the Child block to the new mother block
4
New child block
Page0(Valid)
Page6(Valid)
Page7(Valid)
Page8(Valid)
Page9(Valid)
Page23(Valid)
Page24(Valid)

FIG. 15

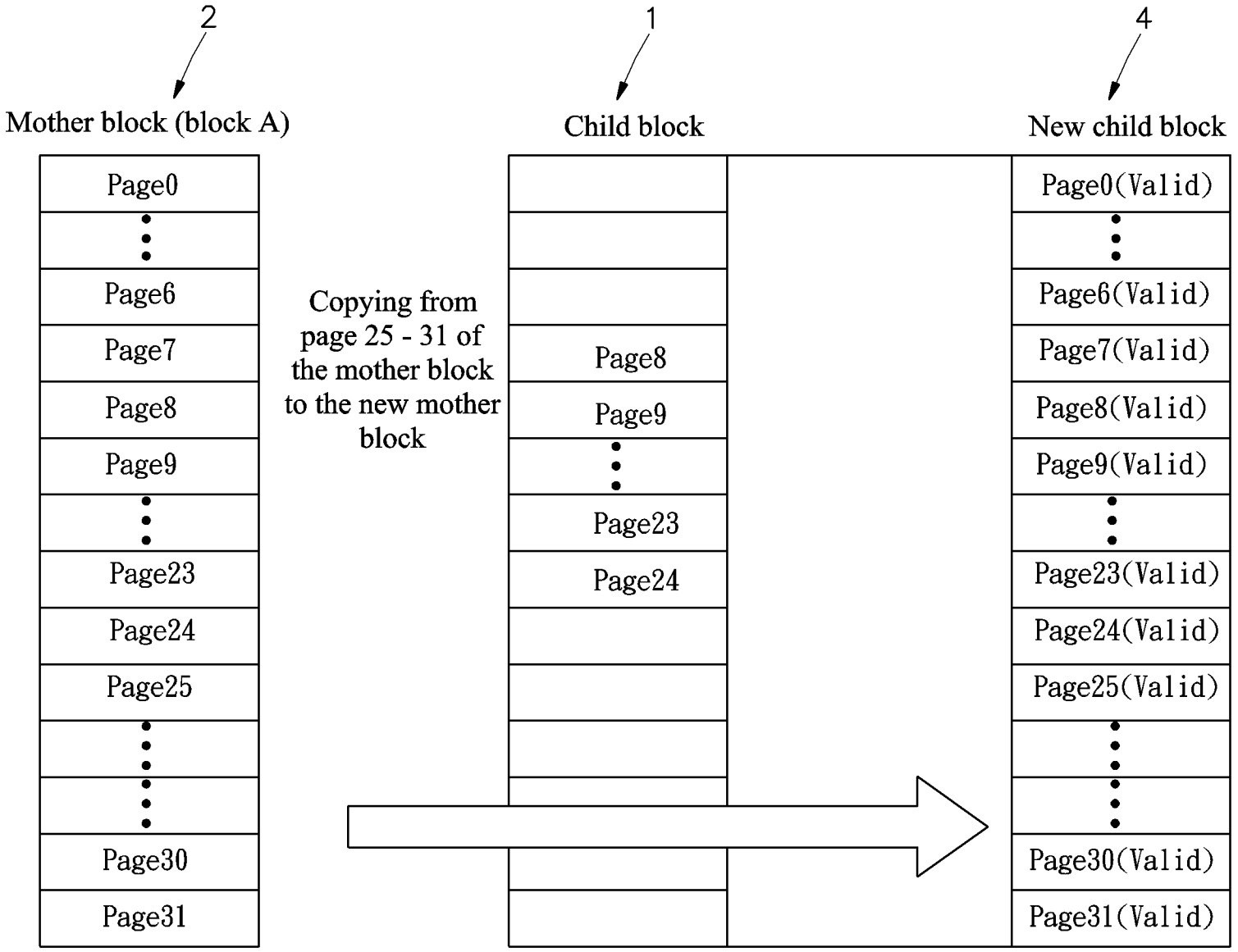

2
1
4
Mother block (block A)
Child block
New child block
Page0
Page6
Page7
Page8
Page9
Page23
Page24
Page25
Page30
Page31
Copying from page 25 - 31 of the mother block to the new mother block
Page8
Page9
Page23
Page24
Page0(Valid)
Page6(Valid)
Page7(Valid)
Page8(Valid)
Page9(Valid)
Page23(Valid)
Page24(Valid)
Page25(Valid)
Page30(Valid)
Page31(Valid)

FIG. 16

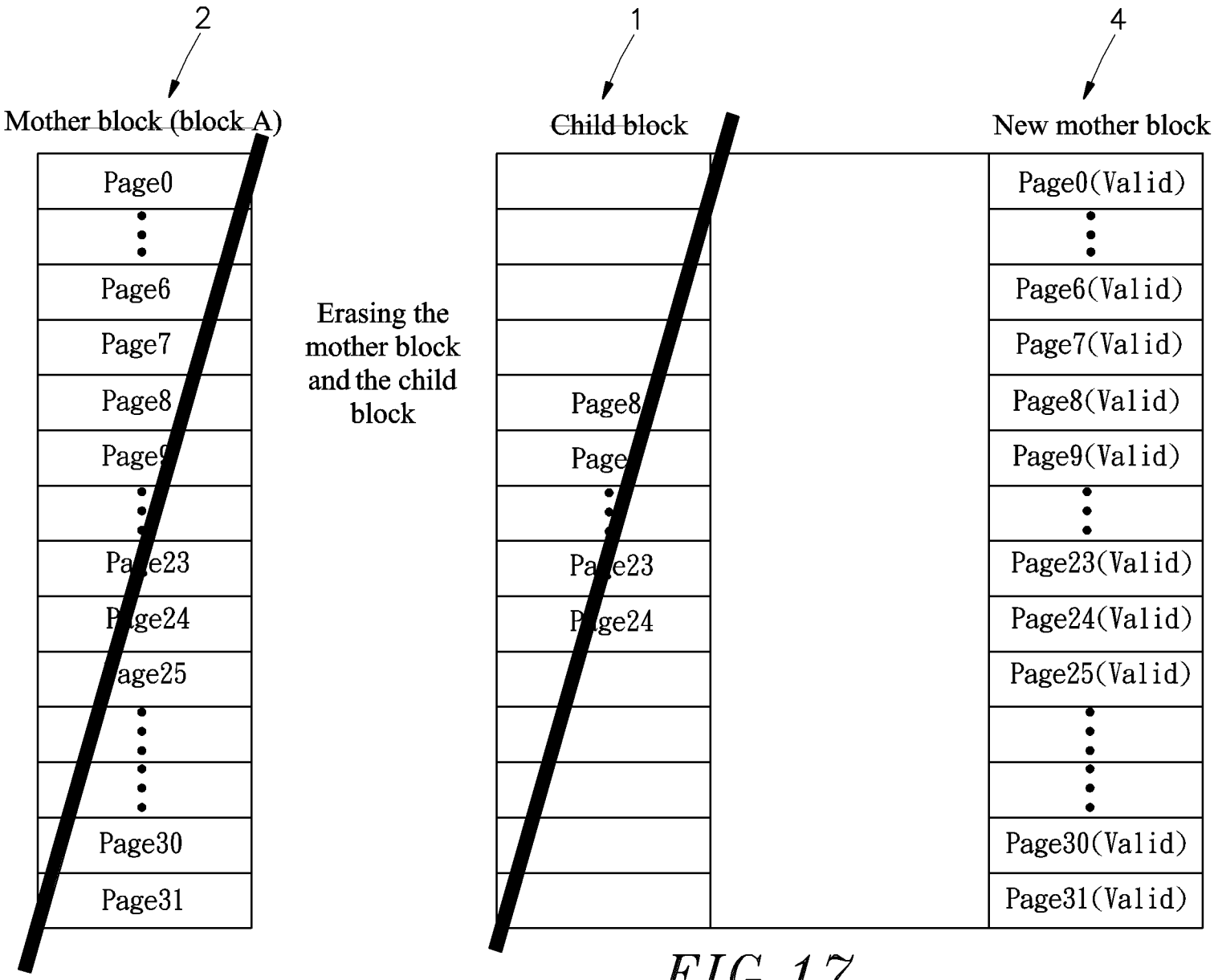

2
Mother block (block A)
Page0
Page6
Page7
Page8
Page23
Page24
Page25
Page30
Page31
Erasing the mother block and the child block
1
Child block
Page8
Page23
Page24
4
New mother block
Page0(Valid)
Page6(Valid)
Page7(Valid)
Page8(Valid)
Page9(Valid)
Page23(Valid)
Page24(Valid)
Page25(Valid)
Page30(Valid)
Page31(Valid)

FIG. 17

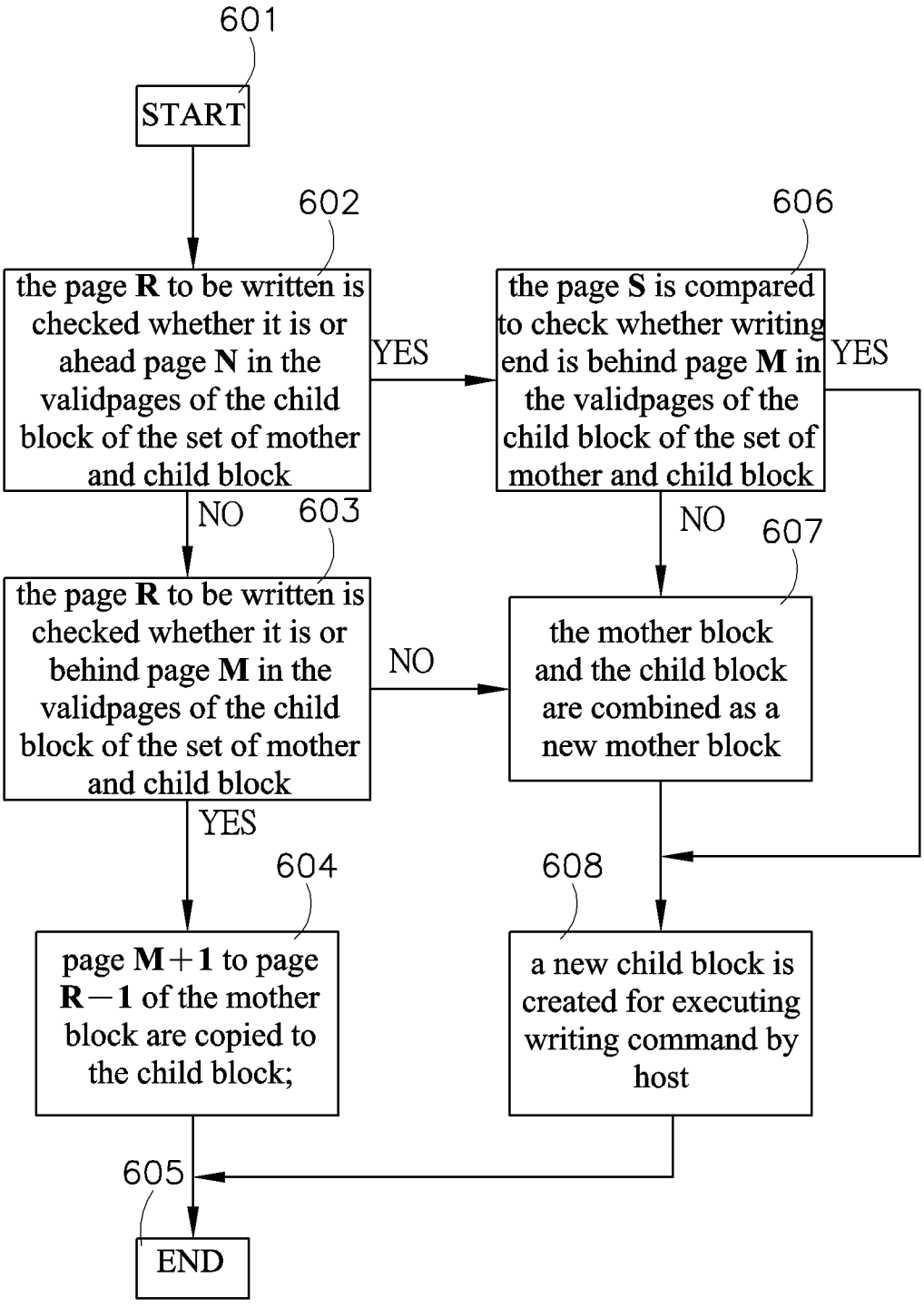

601
START
602
the page R to be written is checked whether it is or ahead page N in the validpages of the child block of the set of mother and child block
YES
606
the page S is compared to check whether writing end is behind page M in the validpages of the child block of the set of mother and child block
YES
NO
603
the page R to be written is checked whether it is or behind page M in the validpages of the child block of the set of mother and child block
NO
NO
607
the mother block and the child block are combined as a new mother block
YES
604
page M+1 to page R−1 of the mother block are copied to the child block;
608
a new child block is created for executing writing command by host
605
END

FIG. 18

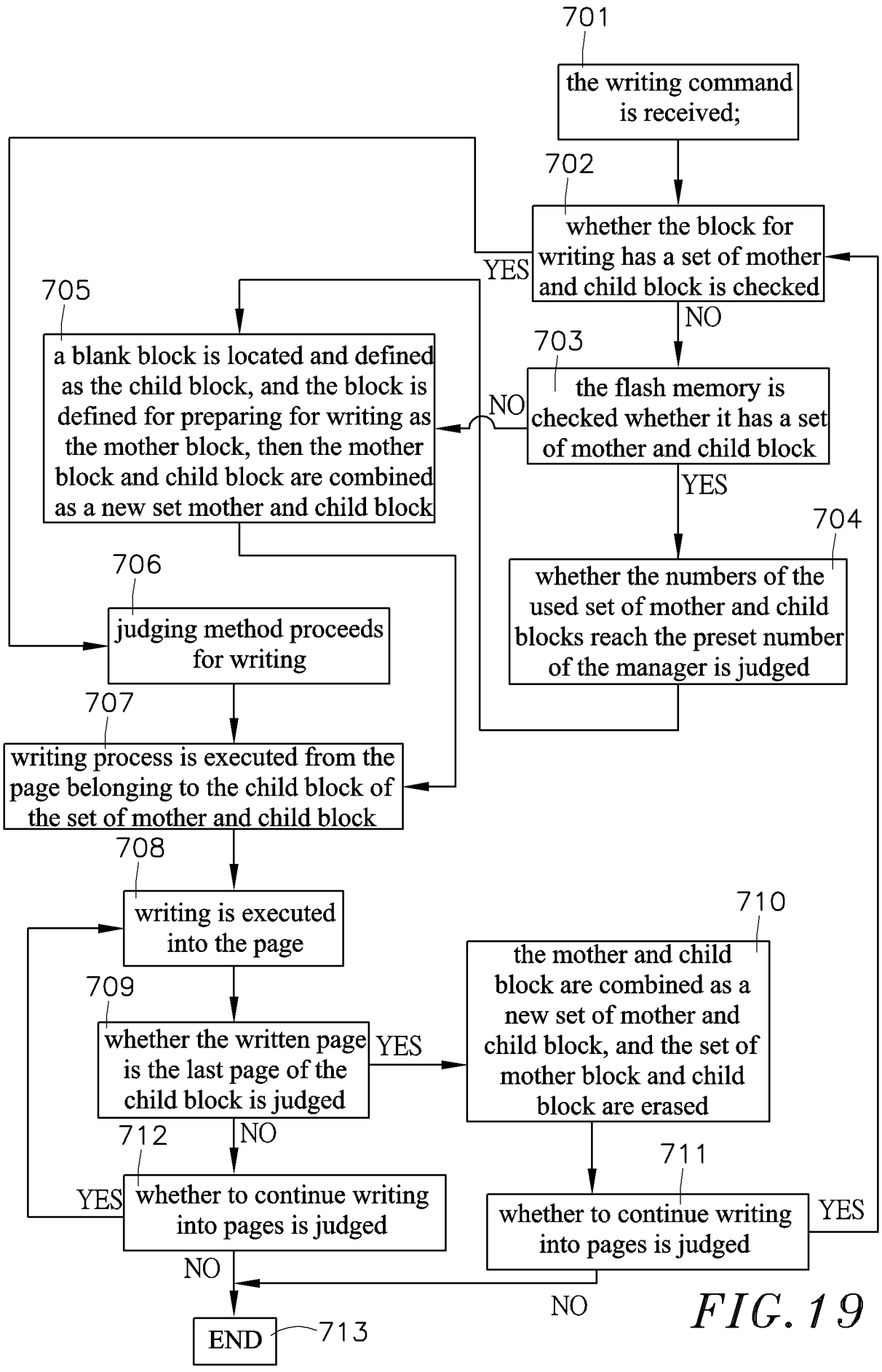

701
the writing command is received;
702
whether the block for writing has a set of mother and child block is checked
YES
NO
703
the flash memory is checked whether it has a set of mother and child block
NO
YES
704
whether the numbers of the used set of mother and child blocks reach the preset number of the manager is judged
705
a blank block is located and defined as the child block, and the block is defined for preparing for writing as the mother block, then the mother block and child block are combined as a new set mother and child block
706
judging method proceeds for writing
707
writing process is executed from the page belonging to the child block of the set of mother and child block
708
writing is executed into the page
709
whether the written page is the last page of the child block is judged
YES
NO
710
the mother and child block are combined as a new set of mother and child block, and the set of mother block and child block are erased
711
whether to continue writing into pages is judged
YES
NO
712
whether to continue writing into pages is judged
YES
NO
END
713

FIG. 19